

Citation:

Beydoun MA, Gary TL, Caballero BH, Lawrence RS, Cheskin LJ, Wang Y. Ethnic differences in dairy and related nutrient consumption among US adults and their association with obesity, central obesity, and the metabolic syndrome. *Am J Clin Nutr*. 2008 Jun;87(6):1914-25.

PubMed ID: [18541585](#)

Study Design:

Cross-sectional Study

Class:

D - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

This study assessed the association between consumption of dairy and related nutrients and obesity, central obesity and the metabolic syndrome (MetS). In addition, the ethnic differences in dairy and related nutrient intakes, metabolic disturbances, and the associations between them.

Inclusion Criteria:

Merged NHANES data for the periods 1999-2000, 2001-2002, and 2003-2004 on adults aged 18 years and over with complete demographic data.

Exclusion Criteria:

Subjects without complete data on MetS and dietary intake.

Description of Study Protocol:**Recruitment**

Nationally representative indicators of obesity, central obesity, and MetS among US adults was constructed from National Health and Nutrition Examination Survey 1999-2004 data, including direct anthropometric assessments, blood pressure, and laboratory tests.

Design: Cross-sectional study

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

Associations between diet (assessed using 24-h recalls) and metabolic and other outcomes were tested using multivariate linear and logistic models and structural equation models.

Data Collection Summary:

Timing of Measurements

Merged NHANES data from 1999-2004.

Dependent Variables

- Anthropometric measures: weight, height, waist circumference
- Blood pressure
- Laboratory: fasting blood glucose, triacylglycerol stores, and HDL cholesterol

Independent Variables

- Dairy product consumption assessed from 24-hr recall for each of the study periods.

Control Variables

- Age
- Sex
- Ethnicity
- Education
- Socioeconomic status
- Physical activity

Description of Actual Data Sample:

Initial N: sample of 17,061 (8970 women and 8091 men) with complete demographic data

Attrition (final N): complete data on MetS and dietary intakes were available for 4519 subjects

Age: adults over age 18

Ethnicity: White, Black, Mexican American and other

Other relevant demographics:

Anthropometrics

Location: United States

Summary of Results:

Key Findings:

- There was a significant inverse association between intake of whole milk, yogurt, calcium and magnesium and metabolic disorders.
- Odds ratios for one more daily serving of yogurt and 100 mg Mg for metabolic syndrome were 0.40 (95% confidence interval: 0.18, 0.89) and 0.83 (95% confidence interval: 0.72,

0.96), respectively.

- The opposite was found for cheese, low-fat milk and phosphorus.
- Multivariate linear regression analyses suggested that dairy consumption is significantly higher among subjects with more than a HS education, and significantly lower among women and minority groups.
- For both genders combined, income (poverty ratio: high compared to low) was inversely related to obesity and central obesity, whereas education (>HS compared with <HS) was inversely related to central obesity.
- Multivariate logistic regression models suggested that there was overall a net increase of 5% in prevalence of central obesity for each dairy serving among men.
- In model 2, whole milk was weakly and negatively associated with the prevalence of central obesity, whereas low-fat milk had the opposite effect.
- In terms of dairy, model 3 suggested that magnesium and calcium were inversely related, and phosphorus was positively related, to poor metabolic profiles.
- The positive association between cheese and central obesity was partly explained by reduced intake of fruits and increased intake of animal-source foods, discretionary solid fat and oils.
- Among all subjects, and among men in particular, fluid milk (servings) was inversely related to blood pressure but not associated with other metabolic outcomes.
- Large ethnic disparities exist for intakes of dairy and calcium, and for all metabolic outcomes, such as BMI and systolic blood pressure.
- Ethnic differences in metabolic outcomes may be at least in part explained by variations in dairy-related nutrients.

Author Conclusion:

In summary, the health effects of dairy products and related nutrients are complex and may not be uniform across the population, at least for obesity and related metabolic disorders. The data also indicate that variations in consumption of dairy products and dairy-related nutrients appear to be factors that account for some of the disparities in risk of obesity and its co-morbidities between major ethnic groups in the US.

Reviewer Comments:

Recent, nationally representative data of adults in the United States.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions

- | | | |
|----|---|-----|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | N/A |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |

3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	Were study groups comparable?	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	Yes

3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	N/A
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	N/A
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A

6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes

10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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